



SMART INVENTORY MANAGEMENT SYSTEM

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ABSTRACT

The Smart inventory management system is an application which is used for the data maintenance of different telecom network elements. The main objective of this inventory application is to give efficient and easy access of all elements. It includes the web interface and mobile application for the accessing of elements data by user. It has the centralized database to store information about the elements. Here database used is mongodb. The mobile application is used here to send the information to centralized location and retrieve the information from the same location. QR code reader is integrated with the application for the fast access of different elements. QR code is pasted and scanned to get the information about the elements. The database can be accessed by the mobile application which is stored in the local network. Mobile application is assigned with the public IP (Internet protocol) address which will redirect to private IP address by using network address translation. The firewall is will be maintained to ensure the secure transfer of data. The intermediate IDE (Integrated development environment) eclipse is used between application and the database. The apache tomcat server will be used in eclipse. Mobile application will get the data with the help of tomcat server. It also has the web interface which shows the elements details. Every information about elements which was added by the mobile application will be reflected in the web interface. This results in an easy management of network elements by using the different technologies.

KEYWORDS: Integrated development environment, Mobile application, Network address translation.

Introduction

In the traditional system of asset management, the data is stored in the books or sheets. It was manual in the traditional system. The data security is the one of the major factor in the traditional system because it is very less secure and inefficient. The traditional system should be replaced with the new more efficient system. Some of them are still using the less efficient methods.

The all the network elements will be identified with special type of method by QR code sticker. When the network element bought to lab the store keeper will generate the QR code for that element and will paste it on the network element. All the details will be sent to the database by using the mobile application by scanning the QR code. The user can access all the network which is posted by the mobile device elements details in the web interface. This makes the inventory system as a user friendly and more efficient system than older system.

The database used here has the more features related to security and it provides the security for the data [1]. The operation of the inventory system contains the different methods which includes the networking operation to post the data and retrieve the data. The web interface is designed in a user-friendly manner and provided with the customized domain name. The web application will be stored in the virtual machine which is located in the local network of the organization. The mobile application is used to access the database which is stored in same virtual machine in local network from the outside the local network, this includes the network address translation mechanism. The core objective of the inventory application is to provide user friendly operations with providing security to data at the same time.

Materials and Methods:

The inventory system model includes the bringing network elements into the lab and adding the corresponding information to the database. As shown in figure 2.1. Every network elements will be bought to lab and store keeper will generate the QR code for that elements and will be pasted on the respective elements. The QR code will be scanned by the mobile application and post it to the database.

All the telecom elements will be having the different parameters and those parameters will be changing the often so it is required to change the QR code and paste it again. After pasting it store keeper has to scan using the mobile application and post it to database. The data can be retrieved by the database from the mobile application using the some of the parameters like serial number or asset number etc. The main of choosing the QR code from the other methods is because of it can store the large amount of data compare to other methods like barcode which can store the data for some extent

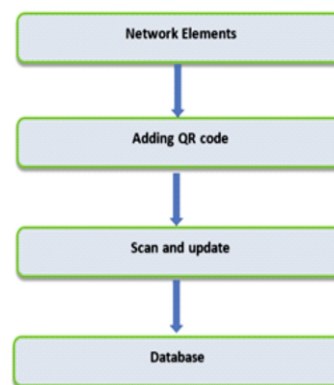


Fig. 2.1 Workflow

The mobile application and web interface will be having the access to webserver which will be running in the virtual machine. The virtual machine will be in the local network of the organisation. The tomcat server and the database will be running in the virtual machine. This is shown in fig 2.2.

All the data will be made available to the both mobile application and the web interface. The both mobile application and web interface may present in the local network as well as the outside the network. To access the local network through public IP necessary modifications should be done.

The http request will be called from the mobile application to the server which will fetch the required data from the database. Same request used with different method to post the data and also alteration of the data through the mobile application. The all the data which is posted by the mobile application will be shown in the web interface.

The different methods available in java to alter the data in the database:

- i. **GET:** This method is used to get the data from the database.
- ii. **HEAD:** This is used to transfer the data of header section.
- iii. **POST:** This method is used to post the data to the database from the device.
- iv. **PUT:** This will replace the content in the database.
- v. **DELETE:** This will lead to remove the respective data from the database.
- vi. **CONNECT:** This will establish the connection to the server.

Virtual machine will be having the windows operating system with system type of 64-bit. The specification includes the 32GB of RAM, with 2.4Ghz of processing speed. The eclipse IDE will be installed on the virtual machine and tomcat server is used here which will be used to fetch the data from the centralized database.

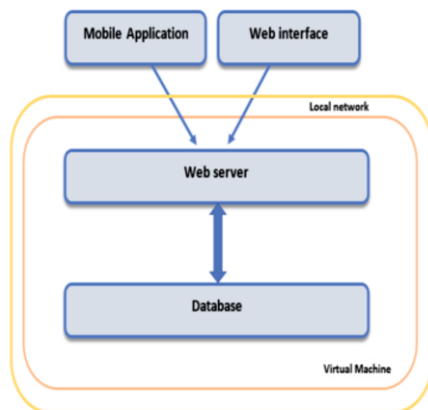


Fig. 2.2 Mobile to database

The mobile application is developed based on android operating system. The android application will be developed in the java programming language. The JSON (JavaScript object notation) data will be sent to the webservice and also while receiving data JSON format is used.

The web interface will be made available by the node.js server which is installed in the same machine. The web interface is developed by the JavaScript, cascading style sheets languages.

Results:

Simulation includes the sending the data from the mobile app and the retrieving it in both mobile application and webpage. The different information about the network elements like serial number, asset number, part number and other details will be posted to database.

From mobile application: Scanning the data and posting it and retrieving data in mobile application by using serial number or any other parameters [6].

The same network elements data will be shown in the webpage which will be running under the node.js server as shown in figure 3.1.



Fig 3.1 Inventory data format

Discussion:

The inventory system management includes different steps from bringing the network elements, pasting a QR code, posting the data using the mobile application and viewing the all elements details in the webpage.

The proposed system includes the following advantages:

- Manual effort reduced: By using QR code based solution the network element information can be stored in database easily.
- Easy tracking: Precise information of network elements is stored and it helps in tracking the elements easily.
- Helps in lab space optimization: using the lab space effectively
- Mobile application search: Searching the network elements details in mobile

application.

- Analytical view: It helps in trend analysis of various elements.

The accessing the database which is stored in a local network of organization from the mobile application requires the network address translation.

NETWORK ADDRESS TRANSLATION: It is the process of assigning a public IP address to a system which is present in private network. This helps in reducing the number of public IP address that can be used by the organization. Usually private network IP address ranges from the 10.0.0.0 to 10.255.255.255. When the system inside a local network request to a computer on the internet. The router will recognize the request is not for within the network [2]. Then it will send request to firewall, fire wall sees the internal IP address and send request to internet with public IP address. When NAT is used like this all intranet systems will access the internet with same public IP address. It explained in the figure 4.1 with class C address type in intranet.

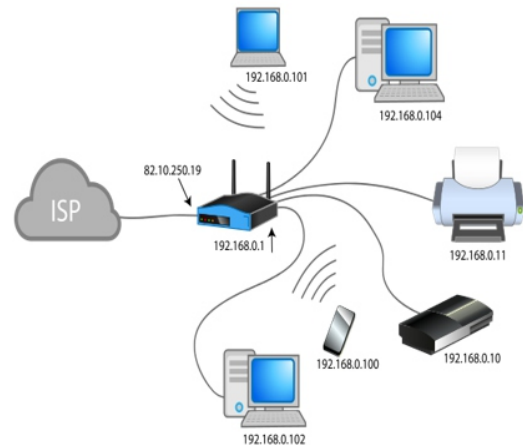


Fig 4.1 Network address translation

DOMAIN NAME SYSTEM: The inventory system includes the web page which has the IP address in the intranet, for the better use of this webpage the Domain name has been given to this IP address and port number. By using this name user can access the webpage easily [4]. It eliminates the using of IP address every time. The DNS server will be located in intranet environment and when you request to a system through name that will be resolved to IP address in a DNS server and data will be fetched from the respective system. This is explained in the figure 4.2.

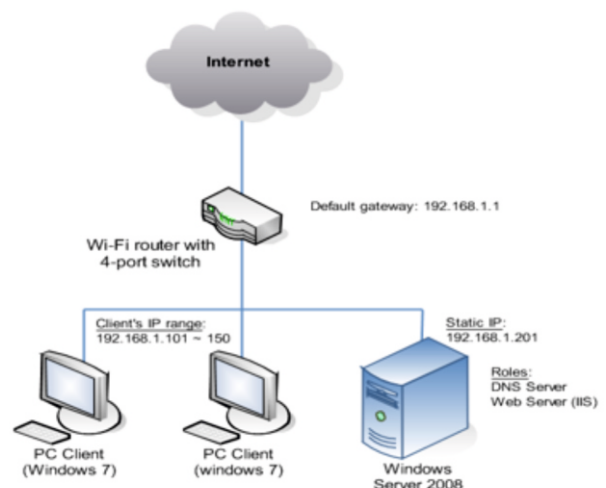


Fig 4.2 Domain name system

FIREWALL AUTHENTICATION: The organization will be having the different intranet networks. If the application stored in one network cannot access easily from the other network [5]. The firewall authentication will be required for secure transfer of data from different locations. By default, all the ports will be blocked by the firewall. If anyone wants to connect to IP address and port the corresponding IP address and port should be enabled for transmission of data. Firewall will be used to protect from the harms which is caused due to the network intrusion. This is used to block some particular sites which is not allowed. It will prevent from accessing intranet computers from the outside computers. Firewall is used to protect the data from the unknown hands. Every intranet will be having the firewall authentication as shown in the figure 4.3.

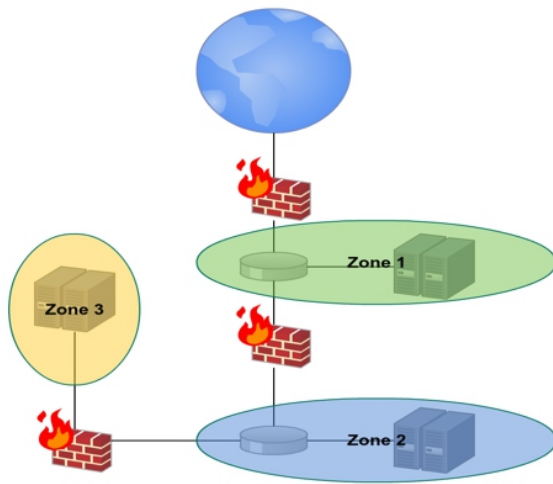


Fig 4.3 Firewall between intranets

Conclusions:

The inventory system includes the generating every element details in a QR code and pasting it on the network elements. Then scanning using the mobile application and post it to the centralized database. This makes the any user to scan the QR code and get the details in a mobile application easily. The same data will be made available in the webpage. This makes the easy tracking of all network elements by user. This saves the man effort. The process includes the different network mechanism like enabling firewall between local networks and internet to provide security for data. This smart inventory makes the all inventory network elements available to user easily with better efficient management.

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